UNITED STATES STEEL - GARY WORKS
Gary, Lake County, Indiana

TDD #: T05-9308-015
PAN #: EIN0218VAA

ecology and environment, inc.
111 WEST JACKSON BLVD., CHICAGO, ILLINOIS 60604, TEL. 312-663-9415
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September 27, 1993

Ms. Pfundheller
Deputy Project Officer
Emergency Response Section
United States Environmental Protection Agency
77 West Jackson Boulevard
Chicago, Illinois 60604

RE: United States Steel - Gary Works, Gary, Lake County, Indiana
TDD#: T05-9308-015
PAN#: EIN0218VAA

Dear Ms. Pfundheller:

On August 12, 1993, the United States Environmental Protection Agency (U. S. EPA) tasked the Ecology and Environment, Inc. (E & E) Technical Assistance Team (TAT) to assist Thad Slaughter of the U. S. EPA Resource Conservation and Recovery Act (RCRA) Division with lagoon sampling at the United States Steel Corporation - Gary Works (U.S.S. - Gary Works) site located in Gary, Lake County, Indiana. The TAT was tasked under Technical Directive Document (TDD) # T05-9308-015. The following letter report outlines the information obtained by the TAT during sampling activities conducted on August 13, 1993.

The U.S.S. - Gary Works site is a Division of the USX Corporation and is located at One North Broadway Avenue, Gary, Lake County, Indiana. The Technical Assistance Team members (TATms) John Nordine and Lisa Ende met Thad Slaughter at 0924 hours on August 13, 1993 at an off-site location and proceeded to the site. The teams arrival and sampling event was unannounced in order to inhibit U.S.S. - Gary Works from altering their daily pumping event. The purpose of the visit was based on the receipt of an anonymous letter by the U. S. EPA. The letter was written by a person concerned with the pumping and disposal operations of contaminated water at the plant. According to the letter, the

person suspected hazardous waste was being pumped into on-site lagoons. The lagoons are former above ground storage tank secondary containment areas with earthen dikes. The tanks have been removed from service.

Upon arrival at the facility, Slaughter and the TATms met with U.S.S. - Gary Works representatives Jerry Botkin and Pat Murphy, Mark Rupnow (sewer project engineer), Les Arnold (plant analytical manager) and Glen Rosenaw (Environmental Department Manager). The site representatives informed Slaughter and the TATms in the reason for and the procedures involved in the pumping of the water. The purpose for pumping the water centered around a consent decree U.S.S. - Gary Works has with the U.S. EPA - Water Division to remediate the sewer lines. The remediation procedure involves the installation of wells at fifty foot intervals along a 1,000 foot section in which the sewer lines are to be repaired. The wells are used to dewater the area and the water is pumped into the former dike areas also referred to as lagoons. Depending on where the work is being performed dictates the number and location of wells that operate on a given day.

After the brief meeting with the site representatives, the TAT and Slaughter were escorted to the lagoon outfall location. The TAT observed a brown tinted liquid in two of three lagoons. The brown tinted liquid was obviously discharging into the lagoons from a large outfall pipe. A photoionization detector (Hnu) was utilized to conduct air monitoring to determine if volatile organics may be emanating from the lagoon. The Hnu reading taken near the outfall pipe read 4 ppm above background. The vegetation that existed in and around the lagoon was dead. The TAT collected two samples from this area, Lagoon One Outfall and Lagoon Two Outfall. prior to collecting well samples.

Upon completion of the lagoon samples, the U.S.S. - Gary Works representatives escorted Slaughter and the TAT to the operating wells. The TAT surveyed the wells with the Hnu and obtained readings at two wells, DW2 and DW4. The Hnu readings were 2 ppm and 3 ppm above background respectively. Samples were then collected from these two wells and labelled DW2 and DW4. In addition to the Hnu readings, an oily layer topped several of the samples as identified through some of the samples containers.

Per the request of U.S.S. - Gary Works representatives, TAT simultaneously collected samples for Gary Steel to run duplicate analysis. The U.S.S - Gary Works sample collection procedure was assisted by Les Arnold.

All samples were collected in accordance with the E & E Standard Operating Procedures and shipped to the EMS Heritage Laboratory in Romeoville, Illinois for analysis. Samples were analyzed for RCRA metals, total cyanide and sulfide, semivolatile and volatile organic compounds. Analytical results were received within the fourteen day verbal turnaround time and a quality assurance level

two data validation package was received within the twenty-one day hard copy turnaround time.

Analytical results reveal all samples contain hazardous levels of benzene as defined by RCRA limits (0.5 ppm). Several other polycyclic aromatic hydrocarbons and arsenic were also identified in the samples. For a complete review of the analytical results consult Table 1.

If you have any questions regarding this report, please feel free to contact me at the Chicago E & E TAT office.

Sincerely,

Lisa M. Ende
Project Manager

cc: Tom Kouris, TATL
Ken Theison, OSC
Thad Slaughter, RCRA

ATTACHMENTS: Table 1
Data Validation Memos

TABLE 1

Table - 1
RESULTS OF CHEMICAL ANALYSIS OF
U.S. STEEL (GARY STEEL SITE)
TAT-COLLECTED SAMPLES

Sample Collection Information and Parameters	Sample Number LAGOON #1 OUTFALL	LAGOON #2 OUTFALL	DW2	DW4
Compound Detected (values in µg/L)				
Volatile Organics				
chloromethane	BDL	BDL	BDL	BDL
bromomethane	BDL	BDL	BDL	BDL
vinyl chloride	BDL	BDL	BDL	BDL
chloroethane	BDL	BDL	BDL	BDL
methylene chloride	BDL	BDL	BDL	BDL
acetone	BDL	BDL	BDL	BDL
carbon disulfide	BDL	BDL	BDL	BDL
1,1-dichloroethene	BDL	BDL	BDL	BDL
1,1-dichloroethane	BDL	BDL	8	BDL
1,2-dichloroethene (total)	BDL	BDL	BDL	BDL
chloroform	BDL	BDL	BDL	BDL
1,2-dichloroethane	BDL	BDL	BDL	BDL
2-butanone (MEK)	BDL	BDL	BDL	BDL
1,1,1-trichloroethane	BDL	BDL	BDL	BDL
carbon tetrachloride	BDL	BDL	BDL	BDL
vinyl acetate	BDL	BDL	BDL	BDL
bromodichloromethane	BDL	BDL	BDL	BDL
1,2-dichloropropane	BDL	BDL	BDL	BDL
cis-1,3-dichloropropene	BDL	BDL	BDL	BDL
trichloroethene	BDL	BDL	BDL	BDL
dibromochloromethane	BDL	BDL	BDL	BDL
1,1,2-trichloroethane	BDL	BDL	BDL	BDL
benzene	590	580	12	6,400
trans-1,3-dichloropropene	BDL	BDL	BDL	BDL
bromoform	BDL	BDL	BDL	BDL
4-methyl-2-pentanone	BDL	BDL	BDL	BDL
2-hexanone	BDL	BDL	BDL	BDL
tetrachloroethene	BDL	BDL	BDL	BDL
toluene	34	32	19	120
1,1,2,2-tetrachloroethane	BDL	BDL	BDL	BDL
chlorobenzene	BDL	BDL	BDL	BDL
ethylbenzene	51	49	3 E	34
styrene	BDL	BDL	BDL	BDL
xylenes (total)	51	49	3 E	34
*	BDL	130 E	240 E	760 E
benzofuran	BDL	BDL	BDL	70 E

* - Also unknown C9 hydrocarbon
E - Estimated
BDL - Below Detection Limit

Table - 1
RESULTS OF CHEMICAL ANALYSIS OF
U.S. STEEL (GARY STEEL SITE)
TAT-COLLECTED SAMPLES

Sample Collection Information and Parameters	Sample Number LAGOON #1 OUTFALL	LAGOON #2 OUTFALL	DW2	DW4
Semivolatile Organics				
phenol	16	15	BDL	BDL
bis(2-chloroethyl)ether	BDL	BDL	BDL	BDL
2-chlorophenol	BDL	BDL	BDL	BDL
1,3-dichlorobenzene	BDL	BDL	BDL	BDL
1,4-dichlorobenzene	BDL	BDL	BDL	BDL
benzyl alcohol	BDL	BDL	BDL	BDL
1,2-dichlorobenzene	BDL	BDL	BDL	BDL
2-methylphenol	41	37	BDL	BDL
bis(2-chloroisopropyl)ether	BDL	BDL	BDL	BDL
4-methylphenol	BDL	BDL	BDL	BDL
n-nitroso-di-n-dipropylamine	BDL	BDL	BDL	BDL
hexachloroethane	BDL	BDL	BDL	BDL
nitrobenzene	BDL	BDL	BDL	BDL
isophorone	BDL	BDL	BDL	BDL
2-nitrophenol	BDL	BDL	BDL	BDL
2,4-dimethylphenol	BDL	BDL	BDL	BDL
benzoic acid	BDL	BDL	BDL	BDL
bis(2-chloroethoxy)methane	BDL	BDL	BDL	BDL
2,4-dichlorophenol	BDL	BDL	BDL	BDL
1,2,4-trichlorobenzene	BDL	BDL	BDL	BDL
naphthalene	370	120	BDL	1300
4-chloroaniline	BDL	BDL	BDL	BDL
hexachlorobutadiene	BDL	BDL	BDL	BDL
4-chloro-3-methylphenol	BDL	BDL	BDL	BDL
2-methylnaphthalene	500	410	BDL	1600
hexachlorocyclopentadiene	BDL	BDL	BDL	BDL
2,4,6-trichlorophenol	BDL	BDL	BDL	BDL
2,4,5-trichlorophenol	BDL	BDL	BDL	BDL
2-chloronaphthalene	BDL	BDL	BDL	BDL
2-nitroaniline	BDL	BDL	BDL	BDL
dimethylphthalate	BDL	BDL	BDL	BDL
acenaphthylene	42	43	BDL	110 E
2,6-dinitrotoluene	BDL	BDL	BDL	BDL
3-nitroaniline	BDL	BDL	BDL	BDL
acenaphthene	900	890	43	1900

* - Also unknown C9 hydrocarbon
E - Estimated
BDL - Below Detection Limit

Table - 1
RESULTS OF CHEMICAL ANALYSIS OF
U.S. STEEL (GARY STEEL SITE)
TAT-COLLECTED SAMPLES

Sample Collection Information and Parameters	Sample Number LAGOON #1 OUTFALL	LAGOON #2 OUTFALL	DW2	DW4
Semivolatile Organics (Cont)				
2,4-dimethylphenol	15	13	25	BDL
4-nitrophenol	BDL	BDL	BDL	BDL
dibenzofuran	BDL	BDL	BDL	BDL
2,4-dinitrotoluene	BDL	BDL	BDL	BDL
diethylphthalate	BDL	BDL	BDL	BDL
4-chlorophenyl-phenylether	BDL	BDL	BDL	BDL
fluorene	450	460	BDL	1100
4-nitroaniline	BDL	BDL	BDL	BDL
4,6-dinitro-2-methylphenol	BDL	BDL	BDL	BDL
n-nitrosodiphenylamine	BDL	BDL	BDL	BDL
4-bromophenyl-phenylether	BDL	BDL	BDL	BDL
hexachlorobenzene	BDL	BDL	BDL	BDL
pentachlorophenol	BDL	BDL	BDL	BDL
phenanthrene	110	150	BDL	530
anthracene	30	46	BDL	BDL
di-n-butylphthalate	BDL	BDL	BDL	BDL
fluoranthene	8 E	17	11	BDL
pyrene	BDL	14	9	BDL
butylbenzylphthalate	BDL	BDL	BDL	BDL
3,3'-dichlorobenzidine	BDL	BDL	BDL	BDL
benzo[a]anthracene	BDL	BDL	BDL	BDL
chrysene	BDL	BDL	BDL	BDL
bis(2-ethylhexyl)phthalate	BDL	BDL	BDL	BDL
di-n-octylphthalate	BDL	BDL	BDL	BDL
benzo[b]fluoranthene	BDL	BDL	BDL	BDL
benzo[k]fluoranthene	BDL	BDL	BDL	BDL
benzo[a]pyrene	BDL	BDL	BDL	BDL
indeno[1,2,3-cd]pyrene	BDL	BDL	BDL	BDL
dibenzo[a,h]anthracene	BDL	BDL	BDL	BDL
benzo[g,h,i]perylene	BDL	BDL	BDL	BDL
pyridine	16 E	13 E	24 E	BDL
carbazole	22	23	BDL	1500
dibenzoturan	640	650		BDL
2-picoline	100	89	55	BDL

* - Also unknown C9 hydrocarbon
E - Estimated
BDL - Below Detection Limit

Table - 1
RESULTS OF CHEMICAL ANALYSIS OF
U.S. STEEL (GARY STEEL SITE)
TAT-COLLECTED SAMPLES

Sample Collection Information and Parameters	Sample Number LAGOON #1 OUTFALL	LAGOON #2 OUTFALL	DW2	DW4
Analyte Detected (values in mg/L)				
RCRA Metals				
aluminum	BDL	BDL	BDL	BDL
antimony	BDL	BDL	BDL	BDL
arsenic	.032	.033	.032	.021
barium	.11	.11	.058	.051
beryllium	BDL	BDL	BDL	BDL
cadmium	BDL	BDL	BDL	BDL
calcium	BDL	BDL	BDL	BDL
chromium	BDL	BDL	BDL	BDL
cobalt	BDL	BDL	BDL	BDL
copper	BDL	BDL	BDL	BDL
iron	BDL	BDL	BDL	BDL
lead	BDL	BDL	BDL	BDL
magnesium	BDL	BDL	BDL	BDL
manganese	BDL	BDL	BDL	BDL
mercury	BDL	BDL	BDL	BDL
nickel	BDL	BDL	BDL	BDL
potassium	BDL	BDL	BDL	BDL
selenium	BDL	BDL	BDL	BDL
silver	BDL	BDL	BDL	BDL
sodium	BDL	BDL	BDL	BDL
thallium	BDL	BDL	BDL	BDL
vanadium	BDL	BDL	BDL	BDL
zinc	BDL	BDL	BDL	BDL
cyanide	BDL	BDL	BDL	BDL
Compound Detected (values in mg/L)				
Total cyanides	.26	.25	.11	.15
pH	7.5	7.5	8.0	7.7
Flammable	211°F	210°F	210°F	210°F

* - Also unknown C9 hydrocarbon
E - Estimated
BDL - Below Detection Limit

Validation Memos

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M E M O R A N D U M

DATE: September 10, 1993

TO: Lee Ende, Project Manager, E&E, Chicago, IL

FROM: Frank C. Dachtler, Chemist, E&E, Cleveland, OH

THRU: Emily S. Landis, Geochemist, E&E, Cleveland, OH

SUBJ: **Solvent Scan Data Quality Assurance Review,** U.S. Steel Site, Gary, Lake County, Indiana

REF: Analytical TDD: T059308809 Project TDD: T059308015
Analytical PAN: EIN0218AAA Project PAN: EIN0218VAA

The data quality assurance review of four aqueous samples, taken from U.S. Steel Site on August 13, 1993, is now complete. The samples were submitted to EMS Heritage Laboratories, Inc., of Romeoville, Illinois, which conducted a GC/MS solvent scan, following SW-846 Method 8240.

The samples were labeled :

TAT	corresponds to ->	laboratory
lagoon 1		C149650
lagoon 2		C149651
DW4		C149652
DW2		C149653

Data Qualifications:

I Holding Time: Acceptable.

The laboratory analyzed samples C149650-651 and -653 were analyzed on August 17, 1993; sample C149652 was analyzed on August 19,1993. This is within the required holding time of 14 days to analysis.

II GC/MS Tuning: Acceptable.

Bromofluorobenzene (BFB) performance standard was analyzed prior to the samples on each day of analysis; all ion abundance criteria were met.

III Initial and Continuing Calibration: Acceptable.

All initial calibration average response factors were greater than zero. The percent relative standard deviations (%RSD) of the response factors in the initial calibration were less than or equal to 30 %RSD, as required.

In the continuing calibration, the percent difference (%D) was less than or equal to 25 %D as required, except for chloromethane (53.83%). No action is required, however, because there were no positive sample results for chloromethane.

IV Error Determination: Precision and bias not determined.

V Blanks: Acceptable.

VOA compounds in the method blank were below the instrument detection limits.

VI Compound Identification: Acceptable.

The relative retention times (RRT) of the three compounds detected in the samples were within 0.06 RRT units of the standard, as required. Compounds present in the standard mass spectra are also present in the sample mass spectra. No stray peaks were present.

VII Compound Quantitation/Stated Detection Limits: Acceptable.

Initial sample volume and dilutions were accounted for in the reported results.

VIII Performance Evaluation Samples: Not Applicable.

IX Optional QC Checks: Acceptable.

All surrogate percent recoveries (%R) were within the specified limits and had greater than 10 %R.

Overall Assessment:

This data evaluation is based upon the criteria outlined in OSWER Directive 9360.4-01 (1990). With the information provided, the results are considered acceptable for use as reported.

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M E M O R A N D U M

DATE: September 13, 1993

TO: Lee Ende, Project Manager, E&E, Chicago, IL

FROM: Frank C. Dachtler, Chemist, E&E, Cleveland, OH FD

THRU: Emily S. Landis, Geochemist, E&E, Cleveland, OH

SUBJ: **Base-Neutral-Acid Extractable Organics (BNA) Data Quality Assurance Review,** U.S. Steel Site, Gary, Lake County, Indiana

REF: Analytical TDD: T059308809 Project TDD: T059308015
Analytical PAN: EIN0218AAA Project PAN: EIN0218VAA

The data quality assurance review of four water samples, taken from U.S. Steel Site on August 13, 1993, is now complete. The samples were submitted to EMS Heritage Laboratories, Inc., of Romeoville, Illinois, to be analyzed for Target Compound List (TCL) BNA organic compounds. The laboratory analyzed the samples by gas chromatography/mass spectroscopy (GC/MS) following SW-846 Method 8270.

The samples were labeled :

TAT	corresponds to ->	laboratory
lagoon 1		C149650
lagoon 2		C149651
DW4		C149652
DW2		C149653

Data Qualifications:

I Holding Time: Acceptable.

The laboratory analyzed samples C149650-651 and -653 were analyzed on August 17, 1993, and samples C149652 was analyzed on August 19,1993. This is within the required holding time of 7 days to extraction, and 40 days to analysis.

II GC/MS Tuning Criteria: Acceptable.

Decafluorotriphenylphosphine (DFTPP) tuning compound was run within 12 hours of the sample analysis on the same instrument. All ion abundance criteria were met.

III Initial and Continuing Calibration: Acceptable.

All initial and continuing calibration average response factors were greater than zero. The percent relative standard deviations (%RSD), of all BNA compounds were less than or equal to 30 %RSD, as required, except for benzyl alcohol (48.359%). However, there was no positive result for this compound, and therefore no action is taken.

In the continuing calibration, the percent difference (%D) was less than or equal to 25 %D for all BNA compounds except for, benzyl alcohol (64.10%), hexachlorocyclopentadiene (35.59%), toluenediamine (35.24%), 2,4,6-tribromophenol (33.54%), heptachlor (26.82%), dieldrin (25.91%), bis(2-ethylhexyl)phthalate (25.32%), bis(2-chloroethyl)ether (28.42%), 3-nitroaniline (27.88%), and endrin aldehyde (43.98%). No positive results are reported for these compounds, therefore no action is taken. Positive results were found for 2-picoline (34.77%) however, and are flagged "J", as required.

IV Error Determination: Precision and bias not determined.

One matrix spike and a matrix spike duplicate were run, each containing eleven different compounds. All were within the laboratory's QC recovery limits except for 1,4-dichlorobenzene and 1,2,4-trichlorobenzene in the matrix spike, and 1,4-dichlorobenzene, N-nitroso-di-n-propylene, and 1,2,4-trichlorobenzene in the matrix spike duplicate. No action is taken based on only two matrix spikes.

V Blanks: Acceptable.

The method blank contained no BNA compounds above the stated quantitation limits.

VI Compound Identification: Acceptable.

The relative retention times (RRT) of the three compounds detected in the samples were within 0.06 RRT units of the standard, as required. Compounds present in the standard mass spectra are also present in the sample mass spectra. No stray peaks were present.

VII Compound Quantitation/Stated Detection Limits: Acceptable.

Initial sample volume and dilutions were accounted for in

the reported results.

VIII Performance Evaluation Samples: Not Applicable.
IX Optional QC Checks: Acceptable.

Surrogate percent recoveries (%R) for samples and blanks were all above the 10% limit, as required.

Overall Assessment:

This data evaluation is based upon the criteria outlined in OSWER Directive 9360.4-01 (1990). With the information provided, the results are considered acceptable for use as reported with the above-stated qualifications.

Data Validation Qualifiers

J The associated numerical value is an estimated quantity because quality control criteria were not met.

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M E M O R A N D U M

DATE: September 14, 1993

TO: Lee Ende, Project Manager, E&E, Chicago, IL

FROM: Frank C. Dachtler, Chemist, E&E, Cleveland, OH

THRU: Emily S. Landis, Geochemist, E&E, Cleveland, OH

SUBJ: **Inorganic Metals Data Quality Assurance Review,** U.S. Steel Site, Gary, Lake County, Indiana

REF: Analytical TDD: T059308809 Project TDD: T059308015
Analytical PAN: EIN0218AAA Project PAN: EIN0218VAA

The data quality assurance review of four aqueous samples, taken from U.S. Steel Site on August 13, 1993, is now complete. The samples were submitted to EMS Heritage Laboratories, Inc., of Romeoville, Illinois, to be analyzed for 8 inorganic metals. The laboratory analyzed the sample by: inductively coupled plasma spectroscopy (ICP); graphite furnace atomic absorption (GFAA) for arsenic and selenium; and cold vapor atomic absorption (CVAA) for mercury. The laboratory followed SW-846 Methods 6010 (ICP), SW-846 7000 series (GFAA), and SW-846 7470 (CVAA).

The samples were labeled :

TAT	corresponds to ->	laboratory
lagoon 1		C149650
lagoon 2		C149651
DW4		C149652
DW2		C149653

Data Qualifications:

I Holding Time: Acceptable.

The samples were extracted and analyzed within the 6-month (28 days for mercury) holding time from the date of sample collection, as required.

II Initial and Continuing Calibration: Acceptable.

ICP and GFAA - Each readings for each standard is within 90 to 110% of the mean of 3 readings, as required. The sample was analyzed within 5 samples of a calibration standard or blank, as required.

CVAA - Each reading was within 80 - 120% of the mean of 3 readings for each standard, as required.

III Blanks: Acceptable.

The concentrations of all blanks falls below the detection limits for all parameters.

IV ICP Interference Check Sample: Acceptable.

All interference check sample results are within the control limits, indicating that instrument interferences were not present.

V Error Determination: Not Applicable.

Precision and bias were not determined for these samples. However, matrix spike and matrix spike duplicate samples were analyzed for each method used. The percent recovery (%R) for each analyte was within 80 to 120%, as required.

VI Performance Evaluation Samples: Not Applicable.

VII Optional QC Checks: Acceptable.

ICP Serial Dilutions - Serial dilutions were not required, except for barium, because sample concentrations exceeded 50 times the instrument detection limit (IDL). The diluted sample agreed within 10% of original determination for the parameter, as required.

Overall Assessment:

This data evaluation is based upon the criteria outlined in OSWER Directive 9360.4-01 (1990). With the information provided, the results are considered acceptable for use as reported.

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M E M O R A N D U M

DATE: September 14, 1993

TO: Lee Ende, Project Manager, E&E, Chicago, IL

FROM: Frank C. Dachtler, Chemist, E&E, Cleveland, OH

THRU: Emily S. Landis, Geochemist, E&E, Cleveland, OH

SUBJ: **Reactive Sulfides Data Quality Assurance Review,** U.S. Steel Site, Gary, Lake County, Indiana

REF: Analytical TDD: T059308809 Project TDD: T059308015
Analytical PAN: EIN0218AAA Project PAN: EIN0218VAA

The data quality assurance review of four aqueous samples, taken from U.S. Steel Site on August 13, 1993, is now complete. The samples were submitted to EMS Heritage Laboratories, Inc., of Romeoville, Illinois, and analyzed for reactive sulfides according to SW-846 Method 9030.

The samples were labeled :

TAT	corresponds to ->	laboratory
lagoon 1		C149650
lagoon 2		C149651
DW4		C149652
DW2		C149653

Data Qualifications:

I Holding Time: Acceptable.

The samples were analyzed within 14 days from the time of collection, as required.

II Instrument Calibration: Acceptable.

A blank and five standards were analyzed. All results are within 90 - 110% of the mean value.

III Method Blank: Acceptable.

The method blank contained no sulfides above the detection limit.

IV Error Determination: Acceptable.

The percent recoveries (%R) of the spiked replicates was within the 80 - 120% limits, as required.

V Performance Evaluation Samples: Not Applicable.

Overall Assessment:

This data evaluation is based upon the guidelines set forth in the OSWER Directive 9360.4-01 (1990). With the information provided, the results may be considered acceptable for use a reported.

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M E M O R A N D U M

DATE: September 14, 1993

TO: Lee Ende, Project Manager, E&E, Chicago, IL

FROM: Frank C. Dachtler, Chemist, E&E, Cleveland, OH

THRU: Emily S. Landis, Geochemist, E&E, Cleveland, OH

SUBJ: **Total Cyanide Data Quality Assurance Review,** U.S. Steel Site, Gary, Lake County, Indiana

REF: Analytical TDD: T059308809 Project TDD: T059308015
Analytical PAN: EIN0218AAA Project PAN: EIN0218VAA

The data quality assurance review of four aqueous samples, taken from U.S. Steel Site on August 13, 1993, is now complete. The samples were submitted to EMS Heritage Laboratories, Inc., of Romeoville, Illinois, which analyzed the sample for total and amenable cyanide according to SW-846 Method 9010.

The samples were labeled :

TAT	corresponds to ->	laboratory
lagoon 1		C149650
lagoon 2		C149651
DW4		C149652
DW2		C149653

Data Qualifications:

I Holding Time: Acceptable.

The samples were analyzed within the 14 day holding time limit, as required.

II Instrument Calibration: Acceptable.

A blank and six standards were analyzed. The correlation coefficient was greater than 0.995, as required.

III Method Blank: Acceptable.

The method blank contained no cyanide above the detection limit.

IV Additional QC Checks: Acceptable.

The matrix spike result was within 20% of the spiked value, indicating that matrix interferences were not present.

Overall Assessment:

This data evaluation is based upon the criteria outlined in OSWER Directive 9360.4-01 (1990). With the information provided, the results are considered acceptable for use as reported.

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M E M O R A N D U M

DATE: September 14, 1993

TO: Lee Ende, Project Manager, E&E, Chicago, IL

FROM: Frank C. Dachtler, Chemist, E&E, Cleveland, OH

THRU: Emily S. Landis, Geochemist, E&E, Cleveland, OH

SUBJ: **pH and Flammability Data Review,** U.S. Steel Site, Gary, Lake County, Indiana

REF: Analytical TDD: T059308809 Project TDD: T059308015
Analytical PAN: EIN0218AAA Project PAN: EIN0218VAA

The data quality assurance review of four aqueous samples, taken from U.S. Steel Site on August 13, 1993, is now complete. The samples were submitted to EMS Heritage Laboratories, Inc., of Romeoville, Illinois, and tested for pH by SW-846 Method 9040, and flashpoint according to SW-846 Method 1010.

The samples were labeled :

TAT	corresponds to ->	laboratory
lagoon 1		C149650
lagoon 2		C149651
DW4		C149652
DW2		C149653

Data Qualifications:

I Holding Time: Not Applicable.

II Calibrations: Acceptable.

pH - The pH meter was calibrated with buffer solutions of 7, 4, and 10 pH. The calibration results were within 10% of the true value.

Flashpoint - The Pensky-Martens Closed-Cup Flashpoint Tester was adequately checked with para-xylene just prior to testing the samples.

Overall Assessment:

There are no specific guidelines in OSWER Directive 9360.4-01 for the evaluation of flashpoint data. However, with the information provided, it is the reviewers professional judgement that the results are acceptable for use as reported.

Lagoon Outfall 1

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE LABORATORIES, INC. 1319 MARQUETTE DRIVE ROMEOVILLE, IL 60441 (708)378-1600	16-AUG-93		C149650
	Complete	PO Number	
	30-AUG-93	VERBAL	
	Printed	Sampled	
	31-AUG-93	13-AUG-93	

Report To	Bill To
EMILY LANDIS ECOLOGY AND ENVIROMENT,INC. 6777 ENGLE ROAD CLEVELAND, OH 44130	EMILY LANDIS ECOLOGY AND ENVIROMENT,INC. 6777 ENGLE ROAD CLEVELAND, OH 44130

Sample Description

DESCRIPTION: LAGOON 1 OUTFALL

VOLATILE ORGANICS SW846-8240A

Analyst: L. DIAZ Analysis Date: 17-AUG-93 11:20 Instrument: GC/MS VOA Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	100	ug/L
ACROLEIN	BDL	250	ug/L
ACRYLONITRILE	BDL	350	ug/L
BENZENE	590	25	ug/L
BROMODICHLOROMETHANE	BDL	25	ug/L
BROMOFORM	BDL	25	ug/L
BROMOMETHANE	BDL	50	ug/L
CARBON DISULFIDE	BDL	25	ug/L
CARBON TETRACHLORIDE	BDL	25	ug/L
CHLOROBENZENE	BDL	25	ug/L
CHLOROETHANE	BDL	50	ug/L
CHLOROFORM	BDL	25	ug/L
CHLOROMETHANE	BDL	50	ug/L
DIBROMOCHLOROMETHANE	BDL	25	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	25	ug/L
DICHLORODIFLUOROMETHANE	BDL	25	ug/L
1,1-DICHLOROETHANE	BDL	25	ug/L
1,2-DICHLOROETHANE	BDL	25	ug/L
1,1-DICHLOROETHENE	BDL	25	ug/L
1,2-DICHLOROPROPANE	BDL	25	ug/L
ETHYLBENZENE	34	25	ug/L
FLUOROTRICHLOROMETHANE	BDL	25	ug/L
2-HEXANONE	BDL	50	ug/L
METHYLENE CHLORIDE	BDL	25	ug/L
METHYL ETHYL KETONE	BDL	50	ug/L
4-METHYL-2-PENTANONE	BDL	50	ug/L
STYRENE	BDL	25	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	25	ug/L
TETRACHLOROETHENE	BDL	25	ug/L
TETRAHYDROFURAN	BDL	120	ug/L
TOLUENE	51	25	ug/L
1,2-DICHLOROETHENE (TOTAL)	BDL	25	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	25	ug/L
1,1,1-TRICHLOROETHANE	BDL	25	ug/L
1,1,2-TRICHLOROETHANE	BDL	25	ug/L

Parameter	Result	Det. Limit	Units
TRICHLOROETHENE	BDL	25	ug/L
VINYL ACETATE	BDL	50	ug/L
VINYL CHLORIDE	BDL	50	ug/L
XYLENE (TOTAL)	140	25	ug/L
ALSO DETECTED			
UNKNOWN C9 HYDROCARBON	EST 140 RT=34.8		
...			
SURROGATE RECOVERY			

DICHLOROETHANE-D4	104		% Rec
TOLUENE-D8	100		% Rec
BROMOFLUOROBENZENE	102		% Rec

SAMPLE WAS ANALYZED AT A 1:5 DILUTION.

GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A

Analyst: H. QIAN Analysis Date: 17-AUG-93 Test: P233.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	1		mL

SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACID FRACTIONS) SW846-8270A

Analyst: H. QIAN Analysis Date: 17-AUG-93 16:51 Instrument: GC/MS SVOA Test: 0505.3.0

Prep: GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A P233.4.0

Parameter	Result	Det. Limit	Units
ACENAPHTHENE	*	10	ug/L
ACENAPHTHYLENE	42	10	ug/L
ANTHRACENE	30	10	ug/L
BENZ(A)ANTHRACENE	BDL	10	ug/L
BENZO(A)PYRENE	BDL	10	ug/L
BENZO(B)FLUORANTHENE	BDL	10	ug/L
BENZO(G,H,I)PERYLENE	BDL	10	ug/L
BENZO(K)FLUORANTHENE	BDL	10	ug/L
BENZYL ALCOHOL	BDL	10	ug/L
BENZYLBUTYLPHTHALATE	BDL	10	ug/L
BIS(2-CHLOROETHOXY)METHANE	BDL	10	ug/L
BIS(2-CHLOROETHYL)ETHER	BDL	10	ug/L
BIS(2-CHLOROISOPROPYL)ETHER	BDL	10	ug/L
BIS(2-ETHYLHEXYL)PHTHALATE	BDL	10	ug/L
4-BROMOPHENYLPHENYLETHER	BDL	10	ug/L
CARBAZOLE	22	10	ug/L
4-CHLOROANILINE	BDL	10	ug/L
2-CHLORONAPHTHALENE	BDL	10	ug/L
4-CHLOROPHENYLPHENYLETHER	BDL	10	ug/L
CHRYSENE	BDL	10	ug/L
DIBENZ(A,H)ANTHRACENE	BDL	10	ug/L
DIBENZOFURAN	*	10	ug/L
1,2-DICHLOROBENZENE	BDL	10	ug/L
1,3-DICHLOROBENZENE	BDL	10	ug/L
1,4-DICHLOROBENZENE	BDL	10	ug/L
3,3'-DICHLOROBENZIDINE	BDL	20	ug/L
DIETHYLPHTHALATE	BDL	10	ug/L
DIMETHYLPHTHALATE	BDL	10	ug/L
DI-N-BUTYLPHTHALATE	BDL	10	ug/L
DINITROBENZENES	BDL	50	ug/L
2,4-DINITROTOLUENE	BDL	10	ug/L
2,6-DINITROTOLUENE	BDL	10	ug/L

Parameter	Result	Det. Limit	Units
DI-N-OCTYLPHTHALATE	BDL	10	ug/L
FLUORANTHENE	EST 8	10	ug/L
FLUORENE	*	10	ug/L
HEXACHLOROBENZENE	BDL	10	ug/L
HEXACHLOROBUTADIENE	BDL	10	ug/L
HEXACHLOROCYCLOPENTADIENE	BDL	10	ug/L
HEXACHLOROETHANE	BDL	10	ug/L
INDENO(1,2,3-CD)PYRENE	BDL	10	ug/L
ISOPHORONE	BDL	10	ug/L
2-METHYLNAPHTHALENE	*	10	ug/L
NAPHTHALENE	*	10	ug/L
2-NITROANILINE	BDL	50	ug/L
3-NITROANILINE	BDL	50	ug/L
4-NITROANILINE	BDL	50	ug/L
NITROBENZENE	BDL	10	ug/L
N-NITROSO-DIPHENYLAMINE	BDL	10	ug/L
N-NITROSO-DI-N-PROPYLAMINE	BDL	10	ug/L
PHENANTHRENE	110	10	ug/L
2-PICOLINE	100	50	ug/L
PYRENE	BDL	10	ug/L
PYRIDINE	EST 16	50	ug/L
TETRACHLOROBENZENES	BDL	10	ug/L
TOLUENEDIAMINE	BDL	50	ug/L
1,2,4-TRICHLOROBENZENE	BDL	10	ug/L
BENZOIC ACID	BDL	50	ug/L
4-CHLORO-3-METHYLPHENOL	BDL	10	ug/L
2-CHLOROPHENOL	BDL	10	ug/L
2,4-DICHLOROPHENOL	BDL	10	ug/L
2,4-DIMETHYLPHENOL	15	10	ug/L
4,6-DINITRO-2-METHYLPHENOL	BDL	50	ug/L
2,4-DINITROPHENOL	BDL	50	ug/L
2-METHYLPHENOL	41	10	ug/L
4-METHYLPHENOL	BDL	10	ug/L
2-NITROPHENOL	BDL	10	ug/L
4-NITROPHENOL	BDL	50	ug/L
PENTACHLOROPHENOL	BDL	50	ug/L
PHENOL	16	10	ug/L
TETRACHLOROPHENOL	BDL	10	ug/L
2,4,5-TRICHLOROPHENOL	BDL	50	ug/L
2,4,6-TRICHLOROPHENOL	BDL	10	ug/L
SURROGATE RECOVERY			
2-FLUOROPHENOL	51		
PHENOL-D5	52		
NITROBENZENE-D5	73		
2-FLUOROBIPHENYL	110		
2,4,6-TRIBROMOPHENOL	140		
TERPHENYL-D14	100		

Concentrations out of calibration range. Sample will be diluted and reanalyzed.

SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACID FRACTIONS) SW846-8270A

Analyst: H. QIAN Analysis Date: 18-AUG-93 18:20 Instrument: GC/MS SVOA Test: 0505.3.1

Prep: GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A P233.4.0

Parameter	Result	Det. Limit	Units
ACENAPHTHENE	900	100	ug/L
DIBENZOFURAN	640	100	ug/L
FLUORENE	450	100	ug/L
2-METHYLNAPHTHALENE	500	100	ug/L
NAPHTHALENE	370	100	ug/L
SURROGATE RECOVERY			
2-FLUOROPHENOL	*		
PHENOL-D5	*		
NITROBENZENE-D5	*		
2-FLUOROBIPHENYL	*		
2,4,6-TRIBROMOPHENOL	*		
TERPHENYL-D14	*		

* *SURROGATES DILUTED OUT.*

CYANIDE AMENABLE DISTILLATION SW846-9010A

Analyst: J. MATTEI Analysis Date: 26-AUG-93 Test: P111.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, AMENABLE TO CHLORINATION (MANUAL) SW846-9010A

Analyst: J. MATTEI Analysis Date: 27-AUG-93 Test: G119.6.0

Prep: CYANIDE AMENABLE DISTILLATION SW846-9010A P111.4.0

Parameter	Result	Det. Limit	Units
CYANIDE, AMENABLE	.09	.01	mg/L

CYANIDE DISTILLATION SW846-9010A

Analyst: J. MATTEI Analysis Date: 18-AUG-93 Test: P101.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, TOTAL (MANUAL) SW846-9010A

Analyst: J. MATTEI Analysis Date: 20-AUG-93 Test: G119.5.0

Prep: CYANIDE DISTILLATION SW846-9010A P101.4.0

Parameter	Result	Det. Limit	Units
CYANIDE	.26	.01	mg/L

PH (AQUEOUS) SW846-9040

Analyst: C. QUARLES Analysis Date: 17-AUG-93 Test: G607.5.0

Parameter	Result	Det. Limit	Units
PH	7.5	0.1	Std. Units

FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A

Analyst: S. CARDWELL Analysis Date: 20-AUG-93 Test: P130.4.1 INDI

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

INSUFFICIENT SAMPLE TO USE AS QC

BARIUM ICP SW846-6010A
Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M104.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
BARIUM	0.11	0.010	mg/L

CADMIUM ICP SW846-6010A
Analyst: M. JAO Analysis Date: 26-AUG-93 08:00 Instrument: ICP Test: M108.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0050	mg/L

CHROMIUM ICP SW846-6010A
Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M110.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

LEAD ICP SW846-6010A
Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M116.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.050	mg/L

SILVER ICP SW846-6010A
Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M130.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A
Analyst: J. ULASZEK Analysis Date: 17-AUG-93 Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

ARSENIC GFAA SW846-7060
Analyst: T. NOHA Analysis Date: 20-AUG-93 Instrument: GFAA Test: M103.2.0
Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	.032	.010	mg/L

SELENIUM GFAA SW846-7740
Analyst: T. NOHA Analysis Date: 24-AUG-93 Instrument: GFAA Test: M128.2.0
Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	.020	mg/L

Sample diluted due to high background.

MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470
Analyst: A. ROBERTSON Analysis Date: 18-AUG-93 Test: P131.6.0 INDI

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

HERITAGE LABORATORIES, INC. Lab Sample ID: C149650

MERCURY CVAA SW846-7470

Analyst: A. ROBERTSON Analysis Date: 19-AUG-93 Instrument: CVAA Test: M120.1.0 INDI

Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

FLASH POINT BY PENSKY-MARTENS CLOSED TESTER ASTM D-93

Analyst: L. RYBSKI Analysis Date: 18-AUG-93 Test: G509.9.0

Parameter	Result	Det. Limit	Units
FLASH POINT	* 211		Degrees F

BOILED AT 211 DEGREES

TOTAL AVAILABLE SULFIDE EXTRACTION SW 7.3.4.1

Analyst: L. RYBSKI Analysis Date: 17-AUG-93 Test: P116.2.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

SULFIDE SW846-9030A

Analyst: L. RYBSKI Analysis Date: 17-AUG-93 Test: G110.4.0

Parameter	Result	Det. Limit	Units
SULFIDE	BDL	4	mg/L

CYANIDE, TOTAL AVAILABLE (MANUAL) SW 7.3.3.2

Analyst: J. MATTEI Analysis Date: 20-AUG-93 Test: G115.1.0

Parameter	Result	Det. Limit	Units
CYANIDE	BDL	.01	mg/L

Sample Comments

* *See Note for Parameter*
BDL Below Detection Limit
EST Estimated Value
RT Retention Time

Sample chain of custody number 5-04314.

9-1-93

Quality Assurance Officer: _____

Lagoon Outfall 2

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE LABORATORIES, INC. 1319 MARQUETTE DRIVE ROMEOVILLE, IL 60441 (708)378-1600	16-AUG-93		C149651
	Complete: 30-AUG-93	PO Number: VERBAL	
	Printed: 31-AUG-93	Sampled: 13-AUG-93	

Report To	Bill To
EMILY LANDIS ECOLOGY AND ENVIROMENT,INC. 6777 ENGLE ROAD CLEVELAND, OH 44130	EMILY LANDIS ECOLOGY AND ENVIROMENT,INC. 6777 ENGLE ROAD CLEVELAND, OH 44130

Sample Description

DESCRIPTION: LAGOON 2 OUTFALL

VOLATILE ORGANICS SW846-8240A

Analyst: L. DIAZ Analysis Date: 17-AUG-93 14:31 Instrument: GC/MS VOA Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	100	ug/L
ACROLEIN	BDL	250	ug/L
ACRYLONITRILE	BDL	350	ug/L
BENZENE	580	25	ug/L
BROMODICHLOROMETHANE	BDL	25	ug/L
BROMOFORM	BDL	25	ug/L
BROMOMETHANE	BDL	50	ug/L
CARBON DISULFIDE	BDL	25	ug/L
CARBON TETRACHLORIDE	BDL	25	ug/L
CHLOROBENZENE	BDL	25	ug/L
CHLOROETHANE	BDL	50	ug/L
CHLOROFORM	BDL	25	ug/L
CHLOROMETHANE	BDL	50	ug/L
DIBROMOCHLOROMETHANE	BDL	25	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	25	ug/L
DICHLORODIFLUOROMETHANE	BDL	25	ug/L
1,1-DICHLOROETHANE	BDL	25	ug/L
1,2-DICHLOROETHANE	BDL	25	ug/L
1,1-DICHLOROETHENE	BDL	25	ug/L
1,2-DICHLOROPROPANE	BDL	25	ug/L
ETHYLBENZENE	32	25	ug/L
FLUOROTRICHLOROMETHANE	BDL	25	ug/L
2-HEXANONE	BDL	50	ug/L
METHYLENE CHLORIDE	BDL	25	ug/L
METHYL ETHYL KETONE	BDL	50	ug/L
4-METHYL-2-PENTANONE	BDL	50	ug/L
STYRENE	BDL	25	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	25	ug/L
TETRACHLOROETHENE	BDL	25	ug/L
TETRAHYDROFURAN	BDL	120	ug/L
TOLUENE	49	25	ug/L
1,2-DICHLOROETHENE (TOTAL)	BDL	25	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	25	ug/L
1,1,1-TRICHLOROETHANE	BDL	25	ug/L
1,1,2-TRICHLOROETHANE	BDL	25	ug/L

Parameter	Result	Det. Limit	Units
TRICHLOROETHENE	BDL	25	ug/L
VINYL ACETATE	BDL	50	ug/L
VINYL CHLORIDE	BDL	50	ug/L
XYLENE (TOTAL)	140	25	ug/L
ALSO DETECTED			
UNKNOWN C9 HYDROCARBON	EST 130 RT=34.8		
...			
SURROGATE RECOVERY			

DICHLOROETHANE-D4	96		% Rec
TOLUENE-D8	100		% Rec
BROMOFLUOROBENZENE	100		% Rec

GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A

Analyst: H. QIAN Analysis Date: 17-AUG-93 Test: P233.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	1		mL

SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACID FRACTIONS) SW846-8270A

Analyst: H. QIAN Analysis Date: 17-AUG-93 17:45 Instrument: GC/MS SVOA Test: 0505.3.0

Prep: GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A P233.4.0

Parameter	Result	Det. Limit	Units
ACENAPHTHENE	*	10	ug/L
ACENAPHTHYLENE	43	10	ug/L
ANTHRACENE	46	10	ug/L
BENZ(A)ANTHRACENE	BDL	10	ug/L
BENZO(A)PYRENE	BDL	10	ug/L
BENZO(B)FLUORANTHENE	BDL	10	ug/L
BENZO(G,H,I)PERYLENE	BDL	10	ug/L
BENZO(K)FLUORANTHENE	BDL	10	ug/L
BENZYL ALCOHOL	BDL	10	ug/L
BENZYLBUTYLPHTHALATE	BDL	10	ug/L
BIS(2-CHLOROETHOXY)METHANE	BDL	10	ug/L
BIS(2-CHLOROETHYL)ETHER	BDL	10	ug/L
BIS(2-CHLOROISOPROPYL)ETHER	BDL	10	ug/L
BIS(2-ETHYLHEXYL)PHTHALATE	BDL	10	ug/L
4-BROMOPHENYLPHENYLETHER	BDL	10	ug/L
CARBAZOLE	23	10	ug/L
4-CHLOROANILINE	BDL	10	ug/L
2-CHLORONAPHTHALENE	BDL	10	ug/L
4-CHLOROPHENYLPHENYLETHER	BDL	10	ug/L
CHRYSENE	BDL	10	ug/L
DIBENZ(A,H)ANTHRACENE	BDL	10	ug/L
DIBENZOFURAN	*	10	ug/L
1,2-DICHLOROBENZENE	BDL	10	ug/L
1,3-DICHLOROBENZENE	BDL	10	ug/L
1,4-DICHLOROBENZENE	BDL	10	ug/L
3,3'-DICHLOROBENZIDINE	BDL	20	ug/L
DIETHYLPHTHALATE	BDL	10	ug/L
DIMETHYLPHTHALATE	BDL	10	ug/L
DI-N-BUTYLPHTHALATE	BDL	10	ug/L
DINITROBENZENES	BDL	50	ug/L
2,4-DINITROTOLUENE	BDL	10	ug/L
2,6-DINITROTOLUENE	BDL	10	ug/L
DI-N-OCTYLPHTHALATE	BDL	10	ug/L
FLUORANTHENE	17	10	ug/L

Parameter	Result	Det. Limit	Units
FLUORENE	*	10	ug/L
HEXACHLOROBENZENE	BDL	10	ug/L
HEXACHLOROBUTADIENE	BDL	10	ug/L
HEXACHLOROCYCLOPENTADIENE	BDL	10	ug/L
HEXACHLOROETHANE	BDL	10	ug/L
INDENO(1,2,3-CD)PYRENE	BDL	10	ug/L
ISOPHORONE	BDL	10	ug/L
2-METHYLNAPHTHALENE	*	10	ug/L
NAPHTHALENE	120	10	ug/L
2-NITROANILINE	BDL	50	ug/L
3-NITROANILINE	BDL	50	ug/L
4-NITROANILINE	BDL	50	ug/L
NITROBENZENE	BDL	10	ug/L
N-NITROSO-DIPHENYLAMINE	BDL	10	ug/L
N-NITROSO-DI-N-PROPYLAMINE	BDL	10	ug/L
PHENANTHRENE	150	10	ug/L
2-PICOLINE	89	50	ug/L
PYRENE	14	10	ug/L
PYRIDINE	EST 13	50	ug/L
TETRACHLOROBENZENES	BDL	10	ug/L
TOLUENEDIAMINE	BDL	50	ug/L
1,2,4-TRICHLOROBENZENE	BDL	10	ug/L
BENZOIC ACID	BDL	50	ug/L
4-CHLORO-3-METHYLPHENOL	BDL	10	ug/L
2-CHLOROPHENOL	BDL	10	ug/L
2,4-DICHLOROPHENOL	BDL	10	ug/L
2,4-DIMETHYLPHENOL	13	10	ug/L
4,6-DINITRO-2-METHYLPHENOL	BDL	50	ug/L
2,4-DINITROPHENOL	BDL	50	ug/L
2-METHYLPHENOL	37	10	ug/L
4-METHYLPHENOL	BDL	10	ug/L
2-NITROPHENOL	BDL	10	ug/L
4-NITROPHENOL	BDL	50	ug/L
PENTACHLOROPHENOL	BDL	50	ug/L
PHENOL	15	10	ug/L
TETRACHLOROPHENOL	BDL	10	ug/L
2,4,5-TRICHLOROPHENOL	BDL	50	ug/L
2,4,6-TRICHLOROPHENOL	BDL	10	ug/L
.			
SURROGATE RECOVERY			

2-FLUOROPHENOL	47		
PHENOL-D5	49		
NITROBENZENE-D5	63		
2-FLUOROBIPHENYL	120		
2,4,6-TRIBROMOPHENOL	140		
TERPHENYL-D14	120		

Concentration is out if calibration range. Sample will be diluted and reanalyzed.

SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACID FRACTIONS) SW846-8270A

Analyst: H. QIAN Analysis Date: 18-AUG-93 19:15 Instrument: GC/MS SVOA Test: 0505.3.1

Prep: GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A P233.4.0

Parameter	Result	Det. Limit	Units
ACENAPHTHENE	890	100	ug/L
DIBENZOFURAN	650	100	ug/L
FLUORENE	460	100	ug/L
2-METHYLNAPHTHALENE	410	100	ug/L
.			
SURROGATE RECOVERY			

2-FLUOROPHENOL	*		
PHENOL-D5	*		
NITROBENZENE-D5	*		
2-FLUOROBIPHENYL	*		
2,4,6-TRIBROMOPHENOL	*		
TERPHENYL-D14	*		

* *SURROGATES DILUTED OUT.*

CYANIDE AMENABLE DISTILLATION SW846-9010A

Analyst: J. MATTEI Analysis Date: 26-AUG-93 Test: P111.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, AMENABLE TO CHLORINATION (MANUAL) SW846-9010A

Analyst: J. MATTEI Analysis Date: 27-AUG-93 Test: G119.6.0

Prep: CYANIDE AMENABLE DISTILLATION SW846-9010A P111.4.0

Parameter	Result	Det. Limit	Units
CYANIDE, AMENABLE	.19	.01	mg/L

CYANIDE DISTILLATION SW846-9010A

Analyst: J. MATTEI Analysis Date: 18-AUG-93 Test: P101.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, TOTAL (MANUAL) SW846-9010A

Analyst: J. MATTEI Analysis Date: 20-AUG-93 Test: G119.5.0

Prep: CYANIDE DISTILLATION SW846-9010A P101.4.0

Parameter	Result	Det. Limit	Units
CYANIDE	.25	.01	mg/L

PH (AQUEOUS) SW846-9040

Analyst: C. QUARLES Analysis Date: 17-AUG-93 Test: G607.5.0

Parameter	Result	Det. Limit	Units
PH	7.5	0.1	Std. Units

FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A

Analyst: S. CARDWELL Analysis Date: 20-AUG-93 Test: P130.4.1 INDI

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

INSUFFICIENT SAMPLE TO USE AS QC

BARIUM ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M104.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
BARIUM	0.11	0.010	mg/L

CADMIUM ICP SW846-6010A

Analyst: M. JAO Analysis Date: 26-AUG-93 08:00 Instrument: ICP Test: M108.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0050	mg/L

CHROMIUM ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M110.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

LEAD ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M116.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.050	mg/L

SILVER ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M130.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A

Analyst: J. ULASZEK Analysis Date: 17-AUG-93 Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

ARSENIC GFAA SW846-7060

Analyst: T. NOHA Analysis Date: 20-AUG-93 Instrument: GFAA Test: M103.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	.033	.010	mg/L

SELENIUM GFAA SW846-7740

Analyst: T. NOHA Analysis Date: 25-AUG-93 Instrument: GFAA Test: M128.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	.020	mg/L

MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470

Analyst: A. ROBERTSON Analysis Date: 18-AUG-93 Test: P131.6.0 INDI

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

HERITAGE LABORATORIES, INC. Lab Sample ID: C149651

MERCURY CVAA SW846-7470

Analyst: A. ROBERTSON Analysis Date: 19-AUG-93 Instrument: CVAA Test: M120.1.0 INDI

Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

FLASH POINT BY PENSKY-MARTENS CLOSED TESTER ASTM D-93

Analyst: L. RYBSKI Analysis Date: 18-AUG-93 Test: G509.9.0

Parameter	Result	Det. Limit	Units
FLASH POINT	* 210		Degrees F

BOILED AT 210 DEGREES

TOTAL AVAILABLE SULFIDE EXTRACTION SW 7.3.4.1

Analyst: L. RYBSKI Analysis Date: 17-AUG-93 Test: P116.2.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

SULFIDE SW846-9030A

Analyst: L. RYBSKI Analysis Date: 17-AUG-93 Test: G110.4.0

Parameter	Result	Det. Limit	Units
SULFIDE	BDL	4	mg/L

CYANIDE, TOTAL AVAILABLE (MANUAL) SW 7.3.3.2

Analyst: J. MATTEI Analysis Date: 20-AUG-93 Test: G115.1.0

Parameter	Result	Det. Limit	Units
CYANIDE	BDL	.01	mg/L

Sample Comments

* *See Note for Parameter*
BDL Below Detection Limit
EST Estimated Value
RT Retention Time

Sample chain of custody number 5-04314.

9-1-93

Quality Assurance Officer: _____

DW 2

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE LABORATORIES, INC. 1319 MARQUETTE DRIVE ROMEOVILLE, IL 60441 (708)378-1600	16-AUG-93		C149653
	Complete: 30-AUG-93	PO Number: VERBAL	
	Printed: 31-AUG-93	Sampled: 13-AUG-93	

Report To	Bill To
EMILY LANDIS ECOLOGY AND ENVIROMENT,INC. 6777 ENGLE ROAD CLEVELAND, OH 44130	EMILY LANDIS ECOLOGY AND ENVIROMENT,INC. 6777 ENGLE ROAD CLEVELAND, OH 44130

Sample Description

DESCRIPTION: DW 2-WELL BY SUBSTATION 5

VOLATILE ORGANICS SW846-8240A

Analyst: L. DIAZ Analysis Date: 17-AUG-93 13:37 Instrument: GC/MS VOA Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	100	ug/L
ACROLEIN	BDL	250	ug/L
ACRYLONITRILE	BDL	350	ug/L
BENZENE	*	25	ug/L
BROMODICHLOROMETHANE	BDL	25	ug/L
BROMOFORM	BDL	25	ug/L
BROMOMETHANE	BDL	50	ug/L
CARBON DISULFIDE	BDL	25	ug/L
CARBON TETRACHLORIDE	BDL	25	ug/L
CHLOROBENZENE	BDL	25	ug/L
CHLOROETHANE	BDL	50	ug/L
CHLOROFORM	BDL	25	ug/L
CHLOROMETHANE	BDL	50	ug/L
DIBROMOCHLOROMETHANE	BDL	25	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	25	ug/L
DICHLORODIFLUOROMETHANE	BDL	25	ug/L
1,1-DICHLOROETHANE	BDL	25	ug/L
1,2-DICHLOROETHANE	BDL	25	ug/L
1,1-DICHLOROETHENE	BDL	25	ug/L
1,2-DICHLOROPROPANE	BDL	25	ug/L
ETHYLBENZENE	120	25	ug/L
FLUOROTRICHLOROMETHANE	BDL	25	ug/L
2-HEXANONE	BDL	50	ug/L
METHYLENE CHLORIDE	BDL	25	ug/L
METHYL ETHYL KETONE	BDL	50	ug/L
4-METHYL-2-PENTANONE	BDL	50	ug/L
STYRENE	BDL	25	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	25	ug/L
TETRACHLOROETHENE	BDL	25	ug/L
TETRAHYDROFURAN	BDL	120	ug/L
TOLUENE	34	25	ug/L
1,2-DICHLOROETHENE (TOTAL)	BDL	25	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	25	ug/L
1,1,1-TRICHLOROETHANE	BDL	25	ug/L
1,1,2-TRICHLOROETHANE	BDL	25	ug/L

Parameter	Result	Det. Limit	Units
TRICHLOROETHENE	BDL	25	ug/L
VINYL ACETATE	BDL	50	ug/L
VINYL CHLORIDE	BDL	50	ug/L
XYLENE (TOTAL)	370	25	ug/L
ALSO DETECTED			
BENZOFURAN	EST 70 RT=33.09		
UNKNOWN C9 HYDROCARBON	EST 760 RT=34.76		
...			
SURROGATE RECOVERY			

DICHLOROETHANE-D4	98		% Rec
TOLUENE-D8	98		% Rec
BROMOFLUOROBENZENE	98		% Rec

SAMPLE WAS ANALYZED AT A 1:5 DILUTION.
** This value is outside of the linear calibration range. The sample will be diluted and reanalyzed.*

VOLATILE ORGANICS SW846-8240A

Analyst: L. DIAZ Analysis Date: 19-AUG-93 10:41 Instrument: GC/MS VOA Test: 0510.3.1

Parameter	Result	Det. Limit	Units
BENZENE	6400	250	ug/L
...			
SURROGATE RECOVERY			

DICHLOROETHANE-D4	105		% Rec
TOLUENE-D8	106		% Rec
BROMOFLUOROBENZENE	106		% Rec

Sample was analyzed at a 1:50 dilution.

GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A

Analyst: H. QIAN Analysis Date: 17-AUG-93 Test: P233.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	1		mL

SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACID FRACTIONS) SW846-8270A

Analyst: H. QIAN Analysis Date: 18-AUG-93 20:09 Instrument: GC/MS SVOA Test: 0505.3.0

Prep: GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A P233.4.0

Parameter	Result	Det. Limit	Units
ACENAPHTHENE	1900	200	ug/L
ACENAPHTHYLENE	BDL	200	ug/L
ANTHRACENE	EST 110	200	ug/L
BENZ(A)ANTHRACENE	BDL	200	ug/L
BENZO(A)PYRENE	BDL	200	ug/L
BENZO(B)FLUORANTHENE	BDL	200	ug/L
BENZO(G,H,I)PERYLENE	BDL	200	ug/L
BENZO(K)FLUORANTHENE	BDL	200	ug/L
BENZYL ALCOHOL	BDL	200	ug/L
BENZYLBUTYLPHTHALATE	BDL	200	ug/L
BIS(2-CHLOROETHOXY)METHANE	BDL	200	ug/L
BIS(2-CHLOROETHYL)ETHER	BDL	200	ug/L
BIS(2-CHLOROISOPROPYL)ETHER	BDL	200	ug/L
BIS(2-ETHYLHEXYL)PHTHALATE	BDL	200	ug/L
4-BROMOPHENYLPHENYLETHER	BDL	200	ug/L
CARBAZOLE	BDL	200	ug/L

Parameter	Result	Det. Limit	Units
4-CHLOROANILINE	BDL	200	ug/L
2-CHLORONAPHTHALENE	BDL	200	ug/L
4-CHLOROPHENYLPHENYLETHER	BDL	200	ug/L
CHRYSENE	BDL	200	ug/L
DIBENZ(A,H)ANTHRACENE	BDL	200	ug/L
DIBENZOFURAN	1500	200	ug/L
1,2-DICHLOROBENZENE	BDL	200	ug/L
1,3-DICHLOROBENZENE	BDL	200	ug/L
1,4-DICHLOROBENZENE	BDL	200	ug/L
3,3'-DICHLOROBENZIDINE	BDL	400	ug/L
DIETHYLPHTHALATE	BDL	200	ug/L
DIMETHYLPHTHALATE	BDL	200	ug/L
DI-N-BUTYLPHTHALATE	BDL	200	ug/L
DINITROBENZENES	BDL	1000	ug/L
2,4-DINITROTOLUENE	BDL	200	ug/L
2,6-DINITROTOLUENE	BDL	200	ug/L
DI-N-OCTYLPHTHALATE	BDL	200	ug/L
FLUORANTHENE	BDL	200	ug/L
FLUORENE	1100	200	ug/L
HEXACHLOROBENZENE	BDL	200	ug/L
HEXACHLOROBUTADIENE	BDL	200	ug/L
HEXACHLOROCYCLOPENTADIENE	BDL	200	ug/L
HEXACHLOROETHANE	BDL	200	ug/L
INDENO(1,2,3-CD)PYRENE	BDL	200	ug/L
ISOPHORONE	BDL	200	ug/L
2-METHYLNAPHTHALENE	1600	200	ug/L
NAPHTHALENE	1300	200	ug/L
2-NITROANILINE	BDL	1000	ug/L
3-NITROANILINE	BDL	1000	ug/L
4-NITROANILINE	BDL	1000	ug/L
NITROBENZENE	BDL	200	ug/L
N-NITROSO-DIPHENYLAMINE	BDL	200	ug/L
N-NITROSO-DI-N-PROPYLAMINE	BDL	200	ug/L
PHENANTHRENE	530	200	ug/L
2-PICOLINE	BDL	1000	ug/L
PYRENE	BDL	200	ug/L
PYRIDINE	BDL	1000	ug/L
TETRACHLOROBENZENES	BDL	200	ug/L
TOLUENEDIAMINE	BDL	1000	ug/L
1,2,4-TRICHLOROBENZENE	BDL	200	ug/L
BENZOIC ACID	BDL	1000	ug/L
4-CHLORO-3-METHYLPHENOL	BDL	200	ug/L
2-CHLOROPHENOL	BDL	200	ug/L
2,4-DICHLOROPHENOL	BDL	200	ug/L
2,4-DIMETHYLPHENOL	BDL	200	ug/L
4,6-DINITRO-2-METHYLPHENOL	BDL	1000	ug/L
2,4-DINITROPHENOL	BDL	1000	ug/L
2-METHYLPHENOL	BDL	200	ug/L
4-METHYLPHENOL	BDL	200	ug/L
2-NITROPHENOL	BDL	200	ug/L
4-NITROPHENOL	BDL	1000	ug/L
PENTACHLOROPHENOL	BDL	1000	ug/L
PHENOL	BDL	200	ug/L
TETRACHLOROPHENOL	BDL	200	ug/L
2,4,5-TRICHLOROPHENOL	BDL	1000	ug/L
2,4,6-TRICHLOROPHENOL	BDL	200	ug/L

Parameter	Result	Det. Limit	Units
SURROGATE RECOVERY			
2-FLUOROPHENOL	*		
PHENOL-D5	*		
NITROBENZENE-D5	*		
2-FLUOROBIPHENYL	*		
2,4,6-TRIBROMOPHENOL	*		
TERPHENYL-D14	*		

* *SURROGATES DILUTED OUT.*

CYANIDE AMENABLE DISTILLATION SW846-9010A

Analyst: J. MATTEI Analysis Date: 26-AUG-93 Test: P111.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, AMENABLE TO CHLORINATION (MANUAL) SW846-9010A

Analyst: J. MATTEI Analysis Date: 27-AUG-93 Test: G119.6.0

Prep: CYANIDE AMENABLE DISTILLATION SW846-9010A P111.4.0

Parameter	Result	Det. Limit	Units
CYANIDE, AMENABLE	.07	.01	mg/L

CYANIDE DISTILLATION SW846-9010A

Analyst: J. MATTEI Analysis Date: 18-AUG-93 Test: P101.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, TOTAL (MANUAL) SW846-9010A

Analyst: J. MATTEI Analysis Date: 20-AUG-93 Test: G119.5.0

Prep: CYANIDE DISTILLATION SW846-9010A P101.4.0

Parameter	Result	Det. Limit	Units
CYANIDE	.15	.01	mg/L

PH (AQUEOUS) SW846-9040

Analyst: C. QUARLES Analysis Date: 17-AUG-93 Test: G607.5.0

Parameter	Result	Det. Limit	Units
PH	7.7	0.1	Std. Units

FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A

Analyst: S. CARDWELL Analysis Date: 20-AUG-93 Test: P130.4.1 INDI

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

INSUFFICIENT SAMPLE TO USE AS QC

BARIUM ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M104.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
BARIUM	0.051	0.010	mg/L

CADMIUM ICP SW846-6010A

Analyst: M. JAO Analysis Date: 26-AUG-93 08:00 Instrument: ICP Test: M108.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0050	mg/L

CHROMIUM ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M110.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

LEAD ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M116.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.050	mg/L

SILVER ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M130.3.0 INDI

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A

Analyst: J. ULASZEK Analysis Date: 17-AUG-93 Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

ARSENIC GFAA SW846-7060

Analyst: T. NOHA Analysis Date: 20-AUG-93 Instrument: GFAA Test: M103.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	.021	.010	mg/L

SELENIUM GFAA SW846-7740

Analyst: T. NOHA Analysis Date: 24-AUG-93 Instrument: GFAA Test: M128.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	.010	mg/L

MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470

Analyst: A. ROBERTSON Analysis Date: 18-AUG-93 Test: P131.6.0 INDI

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

MERCURY CVAA SW846-7470

Analyst: A. ROBERTSON Analysis Date: 19-AUG-93 Instrument: CVAA Test: M120.1.0 INDI

Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

HERITAGE LABORATORIES, INC. Lab Sample ID: C149653

FLASH POINT BY PENSKY-MARTENS CLOSED TESTER ASTM D-93

Analyst: L. RYBSKI Analysis Date: 18-AUG-93 Test: G509.9.0

Parameter	Result	Det. Limit	Units
FLASH POINT	* 210		Degrees F

BOILED AT 210 DEGREES

TOTAL AVAILABLE SULFIDE EXTRACTION SW 7.3.4.1

Analyst: L. RYBSKI Analysis Date: 17-AUG-93 Test: P116.2.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

SULFIDE SW846-9030A

Analyst: L. RYBSKI Analysis Date: 17-AUG-93 Test: G110.4.0

Parameter	Result	Det. Limit	Units
SULFIDE	BDL	4	mg/L

CYANIDE, TOTAL AVAILABLE (MANUAL) SW 7.3.3.2

Analyst: J. MATTEI Analysis Date: 20-AUG-93 Test: G115.1.0

Parameter	Result	Det. Limit	Units
CYANIDE	BDL	.01	mg/L

Sample Comments

* *See Note for Parameter*
BDL Below Detection Limit
EST Estimated Value
RT Retention Time

Sample chain of custody number 5-04314.

9-1-93

Quality Assurance Officer: _____

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE LABORATORIES, INC. 1319 MARQUETTE DRIVE ROMEOVILLE, IL 60441 (708)378-1600	16-AUG-93		C149652
	Complete	PO Number	
	30-AUG-93	VERBAL	
	Printed	Sampled	
	31-AUG-93	13-AUG-93	

Report To	Bill To
EMILY LANDIS ECOLOGY AND ENVIROMENT,INC. 6777 ENGLE ROAD CLEVELAND, OH 44130	EMILY LANDIS ECOLOGY AND ENVIROMENT,INC. 6777 ENGLE ROAD CLEVELAND, OH 44130

Sample Description

DESCRIPTION: DW 4-WELL BY SUBSTATION 5

VOLATILE ORGANICS SW846-8240A

Analyst: L. DIAZ Analysis Date: 19-AUG-93 14:39 Instrument: GC/MS VOA Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	20	ug/L
ACROLEIN	BDL	50	ug/L
ACRYLONITRILE	BDL	70	ug/L
BENZENE	12	5	ug/L
BROMODICHLOROMETHANE	BDL	5	ug/L
BROMOFORM	BDL	5	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON DISULFIDE	BDL	5	ug/L
CARBON TETRACHLORIDE	BDL	5	ug/L
CHLOROBENZENE	BDL	5	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	BDL	5	ug/L
CHLOROMETHANE	BDL	10	ug/L
DIBROMOCHLOROMETHANE	BDL	5	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	5	ug/L
DICHLORODIFLUOROMETHANE	BDL	5	ug/L
1,1-DICHLOROETHANE	BDL	5	ug/L
1,2-DICHLOROETHANE	BDL	5	ug/L
1,1-DICHLOROETHENE	BDL	5	ug/L
1,2-DICHLOROPROPANE	BDL	5	ug/L
ETHYLBENZENE	19	5	ug/L
FLUOROTRICHLOROMETHANE	BDL	5	ug/L
2-HEXANONE	BDL	10	ug/L
METHYLENE CHLORIDE	BDL	5	ug/L
METHYL ETHYL KETONE	BDL	10	ug/L
4-METHYL-2-PENTANONE	BDL	10	ug/L
STYRENE	BDL	5	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	5	ug/L
TETRACHLOROETHENE	BDL	5	ug/L
TETRAHYDROFURAN	BDL	25	ug/L
TOLUENE	EST 3	5	ug/L
1,2-DICHLOROETHENE (TOTAL)	BDL	5	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1,1-TRICHLOROETHANE	BDL	5	ug/L
1,1,2-TRICHLOROETHANE	BDL	5	ug/L

Parameter	Result	Det. Limit	Units
TRICHLOROETHENE	BDL	5	ug/L
VINYL ACETATE	BDL	10	ug/L
VINYL CHLORIDE	BDL	10	ug/L
XYLENE (TOTAL)	250	5	ug/L
1,1-DICHLOROETHANE	8	5	ug/L
ALSO DETECTED			
UNKNOWN C9 HYDROCARBON	EST 240 RT=34.83		
...			
SURROGATE RECOVERY			

DICHLOROETHANE-D4	107		
TOLUENE-D8	* 85		
BROMOFLUOROBENZENE	* 118		

Sample reanalyzed with no improvement in surrogate recovery.

GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A

Analyst: H. QIAN Analysis Date: 17-AUG-93 Test: P233.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1000		mL
FINAL VOLUME	1		mL

SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACID FRACTIONS) SW846-8270A

Analyst: H. QIAN Analysis Date: 17-AUG-93 18:37 Instrument: GC/MS SVOA Test: 0505.3.0

Prep: GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510A P233.4.0

Parameter	Result	Det. Limit	Units
ACENAPHTHENE	43	10	ug/L
ACENAPHTHYLENE	BDL	10	ug/L
ANTHRACENE	BDL	10	ug/L
BENZ(A)ANTHRACENE	BDL	10	ug/L
BENZO(A)PYRENE	BDL	10	ug/L
BENZO(B)FLUORANTHENE	BDL	10	ug/L
BENZO(G,H,I)PERYLENE	BDL	10	ug/L
BENZO(K)FLUORANTHENE	BDL	10	ug/L
BENZYL ALCOHOL	BDL	10	ug/L
BENZYLBUTYLPHTHALATE	BDL	10	ug/L
BIS(2-CHLOROETHOXY)METHANE	BDL	10	ug/L
BIS(2-CHLOROETHYL)ETHER	BDL	10	ug/L
BIS(2-CHLOROISOPROPYL)ETHER	BDL	10	ug/L
BIS(2-ETHYLHEXYL)PHTHALATE	BDL	10	ug/L
4-BROMOPHENYLPHENYLETHER	BDL	10	ug/L
CARBAZOLE	BDL	10	ug/L
4-CHLOROANILINE	BDL	10	ug/L
2-CHLORONAPHTHALENE	BDL	10	ug/L
4-CHLOROPHENYLPHENYLETHER	BDL	10	ug/L
CHRYSENE	BDL	10	ug/L
DIBENZ(A,H)ANTHRACENE	BDL	10	ug/L
DIBENZOFURAN	BDL	10	ug/L
1,2-DICHLOROBENZENE	BDL	10	ug/L
1,3-DICHLOROBENZENE	BDL	10	ug/L
1,4-DICHLOROBENZENE	BDL	10	ug/L
3,3'-DICHLOROBENZIDINE	BDL	20	ug/L
DIETHYLPHTHALATE	BDL	10	ug/L
DIMETHYLPHTHALATE	BDL	10	ug/L
DI-N-BUTYLPHTHALATE	BDL	10	ug/L
DINITROBENZENES	BDL	50	ug/L
2,4-DINITROTOLUENE	BDL	10	ug/L

Parameter	Result	Det. Limit	Units
2,6-DINITROTOLUENE	BDL	10	ug/L
DI-N-OCTYLPHTHALATE	BDL	10	ug/L
FLUORANTHENE	11	10	ug/L
FLUORENE	BDL	10	ug/L
HEXACHLOROBENZENE	BDL	10	ug/L
HEXACHLOROBUTADIENE	BDL	10	ug/L
HEXACHLOROCYCLOPENTADIENE	BDL	10	ug/L
HEXACHLOROETHANE	BDL	10	ug/L
INDENO(1,2,3-CD)PYRENE	BDL	10	ug/L
ISOPHORONE	BDL	10	ug/L
2-METHYLNAPHTHALENE	BDL	10	ug/L
NAPHTHALENE	BDL	10	ug/L
2-NITROANILINE	BDL	50	ug/L
3-NITROANILINE	BDL	50	ug/L
4-NITROANILINE	BDL	50	ug/L
NITROBENZENE	BDL	10	ug/L
N-NITROSO-DIPHENYLAMINE	BDL	10	ug/L
N-NITROSO-DI-N-PROPYLAMINE	BDL	10	ug/L
PHENANTHRENE	BDL	10	ug/L
2-PICOLINE	55	50	ug/L
PYRENE	EST 9	10	ug/L
PYRIDINE	EST 24	50	ug/L
TETRACHLOROBENZENES	BDL	10	ug/L
TOLUENEDIAMINE	BDL	50	ug/L
1,2,4-TRICHLOROBENZENE	BDL	10	ug/L
BENZOIC ACID	BDL	50	ug/L
4-CHLORO-3-METHYLPHENOL	BDL	10	ug/L
2-CHLOROPHENOL	BDL	10	ug/L
2,4-DICHLOROPHENOL	BDL	10	ug/L
2,4-DIMETHYLPHENOL	25	10	ug/L
4,6-DINITRO-2-METHYLPHENOL	BDL	50	ug/L
2,4-DINITROPHENOL	BDL	50	ug/L
2-METHYLPHENOL	BDL	10	ug/L
4-METHYLPHENOL	BDL	10	ug/L
2-NITROPHENOL	BDL	10	ug/L
4-NITROPHENOL	BDL	50	ug/L
PENTACHLOROPHENOL	BDL	50	ug/L
PHENOL	BDL	10	ug/L
TETRACHLOROPHENOL	BDL	10	ug/L
2,4,5-TRICHLOROPHENOL	BDL	50	ug/L
2,4,6-TRICHLOROPHENOL	BDL	10	ug/L
SURROGATE RECOVERY			
2-FLUOROPHENOL	50		% Rec
PHENOL-D5	42		% Rec
NITROBENZENE-D5	56		% Rec
2-FLUOROBIPHENYL	73		% Rec
2,4,6-TRIBROMOPHENOL	99		% Rec
TERPHENYL-D14	83		% Rec

CYANIDE AMENABLE DISTILLATION SW846-9010A
Analyst: J. MATTEI Analysis Date: 26-AUG-93 Test: P111.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, AMENABLE TO CHLORINATION (MANUAL) SW846-9010A
Analyst: J. MATTEI Analysis Date: 27-AUG-93 Test: G119.6.0
Prep: CYANIDE AMENABLE DISTILLATION SW846-9010A P111.4.0

Parameter	Result	Det. Limit	Units
CYANIDE, AMENABLE	.01	.01	mg/L

CYANIDE DISTILLATION SW846-9010A
Analyst: J. MATTEI Analysis Date: 18-AUG-93 Test: P101.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, TOTAL (MANUAL) SW846-9010A
Analyst: J. MATTEI Analysis Date: 20-AUG-93 Test: G119.5.0
Prep: CYANIDE DISTILLATION SW846-9010A P101.4.0

Parameter	Result	Det. Limit	Units
CYANIDE	.11	.01	mg/L

PH (AQUEOUS) SW846-9040
Analyst: C. QUARLES Analysis Date: 17-AUG-93 Test: G607.5.0

Parameter	Result	Det. Limit	Units
PH	8.0	0.1	Std. Units

FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A
Analyst: S. CARDWELL Analysis Date: 20-AUG-93 Test: P130.4.1 INDI

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

INSUFFICIENT SAMPLE TO USE AS QC

BARIUM ICP SW846-6010A
Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M104.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
BARIUM	0.058	0.010	mg/L

CADMIUM ICP SW846-6010A
Analyst: M. JAO Analysis Date: 26-AUG-93 08:00 Instrument: ICP Test: M108.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0050	mg/L

CHROMIUM ICP SW846-6010A
Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M110.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

LEAD ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M116.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.050	mg/L

SILVER ICP SW846-6010A

Analyst: M. JAO Analysis Date: 24-AUG-93 09:00 Instrument: ICP Test: M130.3.0 INDI
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.1

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A

Analyst: J. ULASZEK Analysis Date: 17-AUG-93 Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

ARSENIC GFAA SW846-7060

Analyst: T. NOHA Analysis Date: 20-AUG-93 Instrument: GFAA Test: M103.2.0
Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	.032	.010	mg/L

SELENIUM GFAA SW846-7740

Analyst: T. NOHA Analysis Date: 24-AUG-93 Instrument: GFAA Test: M128.2.0
Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	.010	mg/L

MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470

Analyst: A. ROBERTSON Analysis Date: 18-AUG-93 Test: P131.6.0 INDI

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

MERCURY CVAA SW846-7470

Analyst: A. ROBERTSON Analysis Date: 19-AUG-93 Instrument: CVAA Test: M120.1.0 INDI
Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

FLASH POINT BY PENSKY-MARTENS CLOSED TESTER ASTM D-93

Analyst: L. RYBSKI Analysis Date: 18-AUG-93 Test: G509.9.0

Parameter	Result	Det. Limit	Units
FLASH POINT	* 210		Degrees F

BOILED AT 210 DEGREES

TOTAL AVAILABLE SULFIDE EXTRACTION SW 7.3.4.1

Analyst: L. RYBSKI Analysis Date: 17-AUG-93 Test: P116.2.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

SULFIDE SW846-9030A
Analyst: L. RYBSKI Analysis Date: 17-AUG-93 Test: G110.4.0

Parameter	Result	Det. Limit	Units
SULFIDE	BDL	4	mg/L

CYANIDE, TOTAL AVAILABLE (MANUAL) SW 7.3.3.2
Analyst: J. MATTEI Analysis Date: 20-AUG-93 Test: G115.1.0

Parameter	Result	Det. Limit	Units
CYANIDE	BDL	.01	mg/L

Sample Comments

* *See Note for Parameter*
BDL Below Detection Limit
EST Estimated Value
RT Retention Time

Sample chain of custody number 5-04314.

9-1-93

Quality Assurance Officer: _____